CHAPTER 62
SAFETY RULES FOR AMUSEMENT PARKS AND RIDES

[Prior to 9/24/86, Labor, Bureau of [530]]
[Prior to 10/21/98, see 347—Ch 62]

875—62.1(88A) Purpose, scope and definitions. These rules establish minimum safety standards for the installation, repair, maintenance, use, operation and inspection of amusement parks, amusement rides and concession booths.

62.1(1) *Definitions.* The definitions and interpretations contained in Iowa Code section 88A.1 shall be applicable to such terms when used in this chapter.

"Act" means the Iowa amusement park and ride safety inspection and regulation Act of 1972 (Iowa Code chapter 88A).

"Amusement park" means a tract, structures, area and equipment, including electrical equipment used principally as a location for supporting amusement rides, amusement devices and concession booths.

"Average adult passenger" means, for purposes of design, a person weighing 170 pounds.

"Average child passenger" means, for purposes of design, a child weighing 75 pounds.

"Containing device" is a strap, belt, bar, gate or other safety device designed to prevent accidental or inadvertent dislodgement of a passenger from a ride or device but which does not actually provide physical support.

"Factor of safety" or *"safety factor"* means the ratio of the ultimate or breaking strength of a member or piece of material to the actual working stress or to the maximum permissible or safe load stress when in use.

"Load design" or *"design load"* means the load established by the design engineer or the commissioner for normal operation plus acceptable factors of safety. A device shall be designed to withstand static, dynamic, shock and wind loads.

"Major alteration" is a change in the type or capacity of an amusement ride or device or a change in the structure or mechanism that materially affects its function or operation. This includes but is not limited to changing its mode of transportation from nonwheeled to a truck or flat-bed mount, and changing its mode of assembly or other operational functions from manual to mechanical or hydraulic.

"Major breakdown" means a stoppage of operation from whatever cause resulting in damage, failure or breakage of a stress bearing part of a ride or device.

"Rated capacity" is a capacity established by the design engineer for the normal loading and operation of a ride or device, or in absence thereof, as established by the commissioner after inspection and determination.

"Restraining device" is a safety belt, harness chain, bar or other mechanism designed and utilized for physical support, retention or restraint to the passenger of a ride or device.

"Ride operator" is a person or persons causing the amusement ride or amusement device to go and stop or perform its entertaining function. A ride operator can be the operator's employee.

"Rope," "wire rope" and *"cable"* are interchangeable terms except where the term "fiber rope" is used.

"Safety retainer" is a secondary safety cable, bar, chain, attachment or other device designed to prevent parts of a ride or device from becoming disengaged from the main mechanism or from tipping or tilting in a manner to cause injury to persons riding on or in the vicinity of a ride or device.

62.1(2) *Specific classes of amusement rides.*

a. *"Major ride"* is a device designed to carry a specific maximum number of passengers, adults or children, either by power or gravity in cars or other suitable fixtures for conveying persons.

b. *"Kiddie ride"* is a device designed primarily for use by children but which may accommodate adults.

c. *"New ride"* means a ride or device for which a permit has not been issued by the commissioner for operation in the state, a newly purchased ride, a ride or device that has undergone major alteration, or any other ride or device upon change of title or ownership.

62.1(3) *Inspections.*

a. *"Annual inspection"* is the official inspection of a ride or device made by the commissioner or authorized representative.

b. *"Reinspection"* is an inspection, other than the annual inspection made during the year, of a ride or device as a result of a major breakdown, major alteration, or for any cause which may be deemed necessary by the commissioner.

875—62.2(88A) Design criteria. Structural materials and construction of rides and devices shall conform to recognized engineering practices, procedures, standards and specifications. The design, materials and construction features shall incorporate safety factors acceptable to the commissioner.

62.2(1) *Manufacturers' analyses.* Before a new amusement ride or amusement device is put into operation for the public's use, or whenever any additions or alterations are made which change the structure, mechanism, classification or capacity of any ride or device, the operator shall file with the commissioner a notice of the operator's intention and shall furnish design data, safety factors, materials utilized, stress analysis and other pertinent data deemed necessary by the commissioner. This information shall also be furnished by an operator for existing rides and devices if required by the commissioner. Stress analysis and other data pertinent to the design, structure, factors of safety or performance characteristics shall be in accordance with accepted engineering practices, acceptable to the commissioner and written in English. Data may be requested for, but not limited to, the following materials, parts or components of rides or devices: Structural materials, including bars, cables, chains, ropes, rods, tubing, pipes, girders, braces, fittings, fasteners, trusses, pressure vessels, pressure piping, gears, clutches, speed reducers, welds, bearings, couplings; carriers, such as tubs, cars, chairs, gondolas or seating and carrying apparatus of any description; axles; hangars; pivots; safety bars, belts, harnesses, chains, gates or other restraining, containing or retaining devices. Data shall be furnished at the request of the commissioner concerning forces generated by acceleration or deceleration, centrifugal action, inertia or other forces either constant, reversible or eccentric.

62.2(2) *Rating.* Manufacturers shall identify the capacity of an amusement ride or amusement device in terms of number of passengers and operating speed. This information may be included on the division's identification symbol.

62.2(3) *Seating and carrying devices.* Tubs, cars, chairs, seats, gondolas and other carriers used on rides or devices shall be designed and constructed as strong as practical. Their interior and exterior parts with which passengers may come in contact shall be smooth, rounded, free from sharp, rough or splintered edges or corners, and with no protruding screws or projections which might cause injury. Parts upon or against which passengers might be thrown by action of the ride shall be adequately padded to prevent or minimize the possibility of injury. Propellers or other moving parts or decorations attached to tubs, cars, chairs, seats, gondolas and other carriers shall be securely fastened to such equipment and keyed or otherwise secured so that they cannot come off during operation of the ride. Vanes, canopies or other attachments which might become disengaged shall be secured with safety straps to prevent their flying away in case of breakage or dislocation.

62.2(4) *Speed limiting.* An amusement ride or amusement device capable of exceeding its maximum safe operating speed shall be provided with a maximum speed-limiting device. Steam engines that require an overspeed throttle setting to initiate the operation are exempted.

62.2(5) *Brakes and stops.* On a ride or device where coasting renders the operation dangerous, either during the period while the ride or device is being loaded or unloaded or in case of power failure or other unforeseeable situation, a method of braking shall be provided. Where rollback may cause injury, anti-rollback devices shall be provided.

62.2(6) *Retaining, restraining and containing safety devices.*

a. Retaining safety devices. Tubs, cars, chairs, seats, gondolas or other carriers on a ride that depend upon a single means of attachment or support shall be equipped with safety retainers to prevent a carrier, if it becomes disengaged from its support or attachment, from being catapulted from the ride and to prevent any action of the carrier which might throw the occupants from the carrier. This rule only applies to rides, a ride design or situations determined to be hazardous by the commissioner.

b. Restraining and containing safety devices. Restraining devices used on tubs, cars, chairs, seats, gondolas or other carriers on a ride wherein the forces generated by the action of the ride require retention, restraint or actual physical support of the passenger shall be designed, constructed and installed to withstand impact and forces of a minimum of 850 pounds per passenger. On a ride or a ride design where, after inspection by the commissioner, it is deemed necessary to install safety devices to prevent accidental or inadvertent dislodgement of a passenger from any tub, car, chair, seat, gondola or other carrier, a containing device shall be installed to withstand the design loads.

62.2(7) *Motors, motor circuits and controllers.* Motors, motor circuits and controllers shall be manufactured, constructed and utilized in accordance with Article 430, National Electric Code, NFPA 70-1975. Any motor operating with greater than 50 volts shall have its frame grounded with a conductor which is connected to the service equipment grounding circuit.

62.2(8) *Safety stop circuits.* Electrical safety stop circuits shall be closed circuits so that in case of power failure or malfunction of any element the system will cause the ride or device to which the circuit pertains to fail safe. Circuits shall be all metallic and ungrounded unless otherwise approved by the commissioner. After actuation of a safety stop, the cause shall be determined and the situation corrected before operation of the ride or device is resumed. Safety stop circuits shall not be bypassed during operation.

62.2(9) *Master switch.* Each electrically operated amusement device not designed to be controlled directly by the public shall be provided with a disconnect power switch placed within unobstructed reach of the ride operator.

62.2(10) *Chains.* Chains with certified load carrying capacities may be utilized for safety devices or in stress bearing applications. Twisted wire or stamped chain shall not be used.

62.2(11) *Lock out.* A means shall be provided for locking out or securing rides or equipment for maintenance, repair or inspection. This can be a padlock latch on the master switch.

62.2(12) *Rebuilt or modified ride or device.* An amusement ride or device that is being considered for a major alteration shall be treated as a new ride subject to 62.2(1) to 62.2(11). The altered ride or device shall require an inspection prior to operation.

62.2(13) *Bungee jumping activities.* Bungee jumping activities shall be conducted pursuant to "1992 NABA Guidelines" as published by the North American Bungee Association and occupational safety and health rules adopted at 875—Chapter 10, "General Industry Safety and Health Rules," and 875—Chapter 26, "Construction Safety and Health Rules." If a conflict exists between the rules of the association and OSHA, the OSHA rules shall apply. Variances from the OSHA rules may be requested.

875—62.3(88A) Concession booth requirements.

62.3(1) *General.* Concession booths shall be designed so that bracing rods and the tie down ropes are not projecting in front of booth where the public can trip, stumble or run into the braces or ropes. All front openings and awnings shall be designed with safety latching or safety pin devices that prevent the wind or crowds from forcing rings over pins, braces off from supporting studs or any other type of supporting device off its temporary structural mount. The concession booths shall be constructed to meet the requirements of standard for Tents, Grandstands, Air-Supported Structures Used for Places of Assembly, NFPA No. 102-1972, Section 5, Tents, Paragraph 52, Structural Requirements. Armrests and seating devices shall be designed with adequate strength, smooth and round edges. No sharp material that can cut, puncture or scrape shall be utilized.

62.3(2) *Hazardous.* Concession booths shall not utilize normal hunting or other high-powered rifles or ammunition in shooting galleries. Specific gallery shooting or propelling devices that utilize shells and pellets shall use a nonspattering soft nonricocheting bullet or shot designed and made for shooting galleries. Ricocheting into the public shall be avoided by side reflecting absorbent wings or panels. Ricocheting out the back of the concession booth shall be prevented by adequate absorbing walls and sandbagging or other types of banking along the bottom, rear and side edges of booths. The framework reflecting semihazardous devices, such as handballs and handdarts, shall be constructed to prevent ricocheting or a direct passage through the booth to the public.

875—62.4(88A) Walking surfaces, access and egress.

62.4(1) *General requirements.* Safe and adequate means of access to and egress from amusement rides, devices, concession booths, permanent structures and temporary structures shall be provided. The design, number, location and identification of exits shall be in accordance with the Standard for Tents, Grandstands and Air-Supported Structures Used for Places of Assembly, NFPA No. 102-1972, Section 7, Ways of Egress. All passageways are to be kept free from debris, obstructions, projections and other hazards. All surfaces shall be such as to prevent slipping and tripping, and floors shall be kept free of protruding nails, splinters, holes or loose boards. Where mechanical handling equipment is used, sufficient safe clearances shall be allowed for passageways.

62.4(2) *Stairways, landings and ramps.* Adequate stairways or ramps and the necessary landings and platforms shall be provided where people enter or leave a device, ride or structure that is above or below grade or floor level at entrance to or exit from such amusement. The design and construction of stairways, ramps and railings shall conform to 29 CFR, Chapter XVII, Part 1910 subpart D—Walking—Working surfaces as published at 39 Federal Register 23505 (June 27, 1974) except for the requirement of placement of stairway railings and guards. All stairs with more than one step shall have standard handrails or railings on both sides regardless of width, and when stairways are 88 inches or greater in width, a railing shall be placed approximately in the center. The construction of the standard railings and handrails shall be in accordance with the Federal Register cited in this subrule.

875—62.5 and **62.6** Reserved.

875—62.7(88A) Signal systems. Signal systems shall be provided and utilized for controlling, starting and stopping of a ride or device when the operator of the ride or device does not have a clear view of the point where passengers are loaded or unloaded. Where the need for coded signals is required, the code of signals adopted for operation of the ride or device shall be printed and kept posted at both the operator's station and the location from which the signals are given. Persons who use the signals shall be instructed in their use and shall be trained to understand thoroughly their operation and meaning. Signal systems shall be tested on each day prior to operation of the ride or device. A ride or device requiring a signal system shall not be operated if the system is not performing correctly.

875—62.8(88A) Hazardous materials. The owner shall store and handle liquid petroleum gases and flammable liquids utilized either as fuel for internal combustion engines, for heat or for illumination in accordance with 29 CFR, Chapter XVII, Part 1910 subpart H—Hazardous Materials (Paragraphs 1910.106—Flammable and Combustible Liquids and 1910.110—Storage and Handling of Liquified Petroleum Gases as published at 39 Federal Register 23608 (June 27, 1974). Bulk storage (quantities above 50 gallons) shall not be permitted in any area accessible to the public.

875—62.9 Reserved.

875—62.10(88A) General environment.

62.10(1) *Weather and riot.* During a lightning storm, high wind storm, a period of tornado warning, severe storm warning, fire, or when violence, riot or civil disturbance occurs or threatens in or is a direct threat to an amusement park or a carnival lot, passengers shall be unloaded or evacuated from a ride or device and the ride or device shut down and secured immediately. Operation shall not resume until the situation has returned to a normal safe operating condition.

62.10(2) *Illumination.* Access and exits to and from amusement rides and devices and temporary or permanent structures shall be provided with illumination by natural or artificial means of no less than 5 foot-candles measured at grade level. No less than 10 foot-candles of illumination shall be provided at all work levels for assembly and disassembly of amusement rides and devices and temporary structures.

875—62.11(88A) Medical and first aid. The operator shall ensure the availability of medical personnel. In the absence of an infirmary, clinic or hospital in the proximity to the carnival or amusement park which is available for the treatment of injured public, a person or persons who have a valid certificate in first-aid training from the U. S. Bureau of Mines or the American Red Cross shall be available to render first aid. First-aid supplies recommended by a consulting physician shall be easily accessible when required. The first-aid kit shall consist of materials recommended by the consulting physician in a weatherproof container with individual sealed packages for each type of item. The contents of the first-aid kit shall be checked by the operator at each location stand or at least weekly at amusement parks to ensure that expended items are replaced. The operator shall ensure that telephone numbers for doctor, hospital and ambulance service are conspicuously posted.

875—62.12(88A) Fire protection.

62.12(1) *Fire extinguishers.* The operator shall provide adequate or ensure that adequate fire protection equipment is available within and surrounding the temporary structures that are part of the show. The agent or agency responsible for the permanent structures shall provide or ensure adequate fire protection equipment exists or is available for the permanent structure. The selection, placement and maintenance of fire extinguishers shall be in accordance with Standard for the Installation of Portable Fire Extinguishers, NFPA Number 10-1974.

62.12(2) *Flammable waste and materials.* An operator shall provide identified covered metal containers for flammable waste such as oily rags and other flammable materials which shall be kept in easily accessible locations. Such containers shall be located so that they will not obstruct means of ingress or egress or aisles.

62.12(3) *Flame resistance.* All tents occupied for assembly, or those located within that portion of the premises used by the public and all tents in places of assembly in or about which any devices using fuel are operated, and all tarpaulins and decorative materials used in connection with any of these, shall meet the appropriate requirements for resistance to fire prescribed in the Standard for Flame-Resistant Textiles and Films, NFPA Number 701-1969. Safety nets shall be exempt from the above requirements for resistance to fire. The owner shall have a certificate or a test report from an approved testing agency or engineer indicating fire resistance rating is equal to or better than the above standard.

62.12(4) *Alarm.* The operator shall ensure that the telephone number for the local fire department is conspicuously posted.

875—62.13(88A) Compressed gas and air equipment. Air and gas compressors, tanks, piping and equipment shall be constructed and maintained to ensure safe operation at all times. The equipment shall have safety relief devices and be inspected in accordance with 29 CFR, Chapter XVII, Part 1910 subpart M—Compressed Gas and Compressed Air Equipment as published at 39 Federal Register 23687 (June 27, 1974). Equipment shall be inspected at least once a year. A record of each inspection shall be kept by the owner where the equipment is used and shall be made available on request by the commissioner.

875—62.14 Reserved.

875—62.15(88A) Machinery and machine guarding.

62.15(1) *General requirements.* One or more methods of machine guarding shall be provided to protect the public from injury. An example of double guarding is public barriers and gear shielding. Guards shall be fixed to the machine where possible and secured elsewhere if for any reason attachment to the machine is not possible. The guard or barrier shall be such that it does not offer an accident hazard in itself. Barriers shall be securely staked or sandbagged to prevent movement or tipover by the public falling, pressing or stumbling against them. The barriers shall be located to keep the public at least 6 feet away from the ride. Ride entrances shall have a passenger waiting line retaining chain, bar, gate or device. All machinery designed for a fixed location shall be securely anchored to prevent walking or moving. All rides containing or having a mounting or mountings that would catch, wind up or entangle long hair shall have attached adequate guards.

62.15(2) *Mechanical power transmission.* All power transmission devices and associated moving parts shall be shielded, enclosed or barricaded to protect the public in accordance with 29 CFR, Chapter XVII, Part 1910 subpart O—Machinery and Machine Guarding, Paragraph 1910.219—Mechanical Power Transmission Apparatus as published at 39 Federal Register 23728 (June 27, 1974).

875—62.16 Reserved.

875—62.17(88A) Welding, cutting and brazing. No welding, cutting or brazing shall be accomplished where the public can directly observe the process or be hit by sparks or flying materials generated by the process. Any welding, cutting and brazing accomplished when the general public is in attendance shall be accomplished behind temporary erected solid barriers. The ends of these shall be overlapped to prevent any direct exposure. If the operation cannot be shielded, the operator shall provide a means of keeping the public away from the point of work for a distance of 35 feet for all soldering, brazing, cutting, and gas welding up to ½ inch, 50 feet for all gas welding over ½ inch and 150 feet for all arc welding utilizing electrodes up to 3/16-inch diameter. All larger arc welding operations shall be accomplished behind solid shielding or prior to or after public attendance hours. All compressed gas, compressed gas cylinders, electrical equipment and other apparatus associated with welding, cutting and brazing shall be stored, handled and meet requirements in accordance with 29 CFR, Chapter XIII, Part 1926 subpart J—Welding and Cutting as published at 39 Federal Register 22828 (June 24, 1974).

875—62.18(88A) Operations.

62.18(1) *Location.* The general layouts shall be established such that continuous traffic patterns will exist. Box canyons formed by rides, devices and concession booths shall be avoided. The egress of a ride, device or booth shall not be located immediately in front of hazardous equipment. The layouts shall be such to prevent traffic patterns through the concession booth backyards and shall minimize traffic over any water lines and electrical lines. The intermingling of water lines and electrical lines shall be avoided. Long guy wires or narrow braces utilized for ride, device or booth support shall be clearly marked with streamers or other devices to attract attention when located in traffic patterns.

a. Temporary ride. A ride shall be placed on solid footings, be secured to prevent shifting, tipping, swaying or erratic motion. No cement, brick or similar type blocks shall be permitted. The provision pertinent to erratic motion or sway does not apply to a ride designed to permit flotation characteristics or flexibility. Use of shim blocks shall be kept to a minimum. Depressions in the ground near the ride footings shall be filled and tamped and adequate means of drainage provided to prevent water from collecting and softening supporting areas in case of rain. The area surrounding the ride shall be clear and kept free from trash and tripping hazards. A daily inspection of the ride motion and footings shall be made.

b. Permanent ride. A ride permanently erected in an amusement park shall be set on properly designed and constructed foundations or footings and secured to these footings in a manner to prevent shifting, tipping, swaying or erratic motion. Cement, brick or similar type blocks shall not be permitted. The provision pertinent to erratic motion or sway does not apply to a ride designed to permit flotation characteristics or flexibility. Use of wood shim blocks shall be kept to a minimum.

c. Public protection. Temporary booths shall not be located under aerial amusement devices. Temporary booths utilized for cooking food shall be located such that at least 10 feet of clearance exists on two sides for the use of fire equipment or other emergency vehicles, and shall not be located within 10 feet of amusement rides. A minimum clearance of 6 feet shall exist between an exterior ride and walls, building and other structures. At least 12 feet of clearance shall be maintained between rides.

Except where electrical distribution and transmission lines have been de-energized and visibly grounded at point of work, operation or where insulating barriers, not a part of or attachment to the equipment, ride structure or machinery, have been erected to prevent physical contact with the lines, equipment, ride or machines shall be operated proximate to power lines only in accordance with the following:

(1) For lines rated 50 kv or below, minimum clearance between the lines and any part of a lifting crane, ride structure or equipment shall be 10 feet.

(2) For lines rated over 50 kv, minimum clearance between the lines and the lifting crane, ride, structure or equipment shall be 10 feet plus 0.4 inches for each 1 kv over 50 kv.

(3) During assembly or disassembly a person shall be designated to observe clearance of the equipment and give timely warning for all maneuvers where it is difficult to maintain the desired clearance by visual means.

The operator shall ensure that there exists in the immediate vicinity a device or devices (for example, ladder, fire truck or hydraulic chair lift) which are available for emergency removal of passengers from elevated amusement rides or amusement devices that will not operate.

62.18(2) *Leveling and alignment.* Corner posts, central columns or support structures of a ride designed to operate on a perpendicular axis shall be plumb and secured so that the path of the sweeps or platforms shall be level and operate on a true horizontal plane at right angles to the axis of the pivot. A ride whose carriers are designed to operate on a horizontal axis shall be leveled so that the carriers will orbit in a true perpendicular plane. The base of a ride employing a combination of orbiting planes or a ride whose carriers operate normally in a plane other than true horizontal or vertical shall be leveled and plumbed and secured so that they will not tip or shift and will be stable under the most adverse operating conditions, except for a ride designed to permit flotation characteristics or flexibility or designed to operate properly whether the base is plumb or level or not.

62.18(3) *Ride operators.* A ride or device shall be operated by a competent ride operator trained for the duty. The ride operator of a kiddie ride or device designed for the exclusive use of children shall be at least 16 years of age. For all other major rides or devices an operator shall be at least 18 years of age. A ride operator shall have knowledge of the use and function of all normal operating controls, signal systems and safety devices applicable to the ride or device and of the proper use, function, capacity and speed of the particular ride or device which the operator is operating. A ride operator shall have complete control of the ride or device at all times that it is being operated for the public's use. When the ride or device is shut down provision shall be made to prevent operation by the public. No person other than a trained ride operator shall be permitted to handle the controls of a ride or device during normal operation except where it is designed to be controlled by the passenger.

62.18(4) *Overspeeding and overloading.* A ride or device shall not be loaded beyond its rated capacity nor shall it be operated at an unsafe speed or at any speed other than that prescribed by the design engineer or manufacturer. When this information is not obtainable, the criteria for safe operating speeds and rated capacity will be established by the commissioner.

62.18(5) *Internal combustion power sources.* Fuel tanks for internal combustion power sources should be of adequate capacity to permit uninterrupted operation during normal operating hours. Where it is impossible to provide tanks of proper capacity for a complete day, the ride or device shall be shut down and unloaded or evacuated during the refueling procedure. The fuel supply shall not be replenished while the engines are running. An enclosed area in which an internal combustion engine is operated shall be ventilated. Exhaust fumes from the engine shall be discharged outside the area. Internal combustion power sources shall be located in a manner and shall be protected either by guards, fencing or enclosure to prevent public exposure to hazard and to secure the equipment from the public.

62.18(6) *Maintenance.*

a. General. All equipment relative to amusement rides, amusement devices and concession booths shall be given periodic maintenance service. This shall include properly lubricating and cleaning machinery, engines and motors. Worn mechanical parts, padding material and cushioning shall be replaced and kept in a safe condition, and machinery shall be periodically inspected for loose fasteners. Lockout devices shall be engaged prior to inspecting or servicing a piece of equipment. The upholstery shall be examined, and no loose or flapping portions of upholstery or decoration shall be permitted. Equipment and structure for amusement rides, amusement devices and concession booths shall be kept free from protruding nails, loose nails, splintered wood, loose and wobbly seats and rough, loose or dangerous armrests.

b. Wire rope.

(1) Wire rope shall be thoroughly examined. Wire rope found to be damaged shall be replaced with new rope of proper design and capacity. Any of the following conditions shall be cause for rope replacement:

In running ropes, six randomly distributed broken wires in one rope lay, or three broken wires in one strand in one rope lay. A rope lay is the length along the rope in which one strand makes a complete revolution around the rope.

In pendants or standing ropes, (ropes bearing the entire load and subjected to constant pressure and surge shocks) evidence of more than one broken wire in one rope lay.

Abrasion, scrubbing or peening causing loss of more than one-third of the original diameter of the outside wires.

Severe corrosion.

Severe kinking, severe crushing, or other damage resulting in distortion of the rope structure.

Heat damage resulting from a torch or arc caused by contact with electrical wires.

Reduction from normal diameter of more than 3/64 inch for diameters up to and including ¾ inch; 1/16 inch for diameters 7/8 inch to 1-1/8 inches; 3/32 inch for diameters 1¼ inches to 1½ inches. Marked reduction in diameter indicates deterioration of the core resulting in lack of proper support for the load carrying strands.

Bird caging or other distortion resulting in some members of the rope structure carrying more load than others.

Noticeable rusting or development of broken wires in the vicinity of attachments. If this condition is localized in an operating rope, the section in question can be eliminated by making a new attachment. This may be done rather than replacing the entire rope.

(2) Wire ropes used to support, suspend, bear or control forces and weights involved in the movement and utilization of tubs, cars, chairs, seats, gondolas, other carriers, the sweeps or other supporting members of a ride or device shall not be lengthened or repaired by splicing.

(3) Couplings, sockets and fittings shall be of a design and type approved by the commissioner and installed in accordance with the instructions or specifications of the designer, engineer or manufacturer.

c. Wood components. Footings, splices, uprights, track timbers, ledgers, sills, laps, bracing, flooring and all other wood components of rides, devices and structures shall be inspected for deterioration, cracks or fractures. Emphasis shall be given to ensuring tight nails, bolts, lag bolts and other fasteners. A minimum of 18 inches of soil, with respect to grade, shall be removed around piling or wood members embedded in dirt for support to check deterioration. When wood piling requires replacement, ground level concrete piers shall be used. Wood members found to be defective shall be replaced with material of equal or greater strength and capacity. Repairs and replacements to fixed roller coasters shall be made in accordance with the recommendations of the manufacturer.

d. Housekeeping. An adequate number of containers for refuse shall be provided in and around all amusement rides and devices, permanent structures and temporary structures. Excessive accumulations of trash and refuse shall be promptly removed. All parts of amusement rides and devices, temporary structures and permanent structures used by the public shall be maintained in a clean condition. All walkways between amusement rides and devices shall be kept free from debris, obstructions or other hazards.

e. Electric motors. Electric motors exposed to water shall be given a dielectric test at least annually to ensure a safe operation and the results are to be kept with the carnival or in the amusement park.

f. Wire rope rollers, drums and sheaves. The mechanical devices that brake, control or come in contact with wire rope, such as rollers, drums and sheaves shall be examined on a periodic basis to ensure cleanliness and safe condition. Mechanical devices with broken chips, undue roughness or uneven wear shall be replaced immediately.

g. Articulations and bearings. The articulating pinions, frames, sweeps, eccentrics and other mechanical members shall be inspected for wear, out of round, cracks and other signs of deterioration, and shall be kept in good repair. Bearing surfaces, ball joints and other single or multiple direction mechanical surfaces shall be kept well lubricated, clean and inspected for out of round or out of spherical and shall be kept in good repair. Gear alignment and gear drives shall be kept in good repair.

h. Electrical wiring. Motor wiring, general service circuitry, decorative wiring, festoon wiring and concession stand wiring shall be inspected for insulation wear, fraying or other signs of deterioration such as cracking. Secure tape repairs may be used; however, use of tape repairs shall be kept to a minimum. Wire clips on articulating devices shall be kept in good repair, and wires at elbows and at the end of articulating devices shall be emphasized during inspections.

i. Safety devices. Retaining, restraining and containing devices shall be inspected to ensure they can continuously fulfill their function. Worn and damaged areas shall be repaired immediately or shall be cause for immediate replacement.

j. Hydraulic systems. The system is to be checked for leaks, damaged pipes and worn or deteriorated hoses.

k. Relief devices. Pressure relief valves or devices shall be exercised on a periodic basis to ensure that they operate properly. This includes compressed air and gas devices.

875—62.19(88A) Electrical. Electrical conductors and electrical equipment installed and utilized on or around permanent and temporary amusement parks and amusement rides shall conform to National Electrical Code, NFPA Number 70-1975. The following rules are stated for emphasis and clarification and are supplemental to the National Code. If any conflict exists or appears to exist, the National Code shall have precedence.

62.19(1) *Installation.* Portable electrical systems required by temporary amusement rides or devices and temporary structures shall be installed by a qualified electrician.

62.19(2) *Grounding.* A carnival shall not operate until all grounding electrode conductors, equipment and safety grounding connections are secured, polarized and tested. The grounding conductors shall conform to the National Electrical Code, NFPA Number 70-1975, Article 250—Grounding, Paragraphs 250-94 Size of Alternating Current Grounding Electrode Conductor and 250-95 Size of Equipment Grounding Conductors. The path to ground from circuits, equipment and conductor enclosures shall be permanent and continuous and shall have ample carrying capacity to conduct currents liable to be imposed on it, and shall have impedance sufficiently low to limit the potential above ground and to facilitate the operation of the overcurrent devices in the circuit.

a. Service ground. Equipment or generators operating from a separate supply or supplies which are located closer than 8 feet and all service equipment within itself shall be bonded together. The service ground shall be established by connecting the grounding conductor to the service entrance neutral bar in the hot truck or generator and to an approved type service grounding electrode such as ground rods. If 25 ohms or less is not obtained by a single grounding electrode such as a ground rod plate or pipe it shall be augmented by one additional grounding electrode of the type permitted by code.

b. Circuit and equipment safety. From the service entrance neutral bar, the circuit grounded and equipment safety grounding conductors shall be continuous and separate throughout the entire system. The portable outlet and terminal boxes shall contain a service ground through grounded receptacles for both circuit and safety. The equipment safety grounding conductors shall be attached to each ride, device or concession booth such that impedance is sufficiently low to limit the potential above ground and to facilitate the operation of the overcurrent devices in the circuit. Separate steel tracks or steel framework, such as roller coaster tracks or big slides, shall have grounding the same as the service equipment.

62.19(3) *Current limiting devices.* Conductors shall be fused or protected to their current carrying capacities. No more than six disconnect switches are to be in the hot truck or generator unless a main switch is provided. All distribution lines from hot trucks or generators shall be either 100 amp. or 200 amp. capacity. No fuses or current limiting devices shall be installed in the neutral or grounding conductors. Motors and lighting circuits shall be fused separately.

62.19(4) *Concession booth wiring.* Concession booth overhead wiring may be done with approved Type C brewery cord (not smaller than No. 12 with a built-in tracer for identification of the neutral wire) and weatherproof, pigtail lamp sockets, polarized, soldered and taped to the brewery cord with polarized male cord cap on the end that plugs into the current supply. Approved type pin sockets are acceptable when used on stranded conductors. Lengths up to 40 feet may be used without a messenger support wire provided the tie off on each end terminates in an insulating block or knob. S.O. cord sets may be used. Cord sets not to be installed lower than 8 feet except where they are not accessible to the public. Other concession booth wiring may include any of the approved National Electrical Code wiring methods suitable for the condition of use. Portable wiring methods are covered specifically by Article 400 of the National Electrical Code, NFPA Number 70-1975; Section 305 shall also be utilized. If lamps and long sockets are lower than 8 feet, they shall be guarded and grounded.

62.19(5) *Bus bars.* Bus bars shall be located low or near the bottom of the cabinet. Separate bus bars shall be provided for grounding neutral and phase conductors.

Color codes painted on inside and outside of box, but not on contact surfaces of bus bars, are to be:

Ground—Green or Green with Yellow Strip	1st Phase—Black
Neutral—White or Natural Gray	2nd Phase—Red
	3rd Phase—Blue

On a four-wire delta-connected secondary, the phase conductor having the higher voltage to ground shall be orange. These color codes are to carry on through all connected wiring from service through portable power outlet and terminal boxes. Buses shall not be less than 200 ampere capacity. The load terminals in a switch-board or panel board shall be located so that it will be unnecessary to reach across or beyond a live bus (hot bus) to make a local connection.

62.19(6) *Portable power, terminal box, supply cords, and cables.*

a. Portable power outlet and terminal box. Boxes are to be rain tight and kept locked during the time when the general public is in the area. Wood boxes may be used if insulated on all sides with fire resistant material or painted with insulating varnish. The service power shall be connected to the box by receptacles mounted on the exterior walls which includes the safety grounding. The distribution within the box shall be accomplished by neutral terminal bar(s) and circuit breakers or fuses. The branch circuits which include the equipment safety grounding shall obtain their power through receptacles mounted on the exterior of the box. The exterior openings of the receptacles must be at least 6 inches above ground level and provided with a protective cover, draining eave or canvas, that will avoid the possibility of rain on the receptacle. If it is required to run conductors directly through an opening on the wall of the box for additional service or to obtain required ampacity, the opening(s) shall be color coded and shall be sized to prevent public accessibility to the interior of the box. The fuses or breakers, in the boxes, shall be secured permanently in place, and all connections to the bus bars within the boxes to be made with threaded screws and lugs of the proper size to fasten wiring in place.

b. Supply cords and cables. Portable or permanent cord or cable assemblies supplying power to the current-limiting disconnect of a ride, concession booth, or device shall contain within the assembly a conductor of equal size for equipment grounding. All conductors within the assembly shall not be smaller than #12 awg (American Wire Gage) wire and cords or cable assemblies purchased for this purpose after May 1, 1975, shall not be smaller than #10 awg (American Wire Gage) wire. Current-carrying conductors within the assembly shall be protected with current-limiting devices rated at or below the current-carrying capacity of the conductors.

62.19(7) *Power sources.* Electrical power sources shall be located in a manner permitting proper maintenance and shall be protected either by guards, fencing or enclosure to prevent exposure to hazard and to secure the equipment from the public.

These rules are intended to implement Iowa Code chapter 88A.

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CHAPTERS 63 to 70
Reserved